APRIL/MAY 2025

GCM14/GCP13/DCM14/DCP13 — ADVANCED BUSINESS STATISTICS

Time : Three hours Maximum : 75 marks

Shanmuga Industries Arts & Science College T.V.Malai

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Give the formula for calculating Karl Pearson's coefficient of correlation.

2. What do you mean by multiple regression?

3. What is an estimating equation?

4. Write a note on Poisson distribution.

5. Name the two types of hypothesis.

6. Give the formula for 't' Test.

7. State the uses of chi-square test.

8. What is test of independence?

9. What do you mean by normal distribution?

10. Give the assumptions of two way ANOVA.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Calculate coefficient of correlation from the following data:

Case	A	B	C	D	E	F	G	H
X_1	10	6	9	10	12	13	11	9
X_2	9	4	6	9	11	13	8	4

Or

(b) Write notes about regression analysis.

12. (a) What are the types of probability distribution? Explain.

Or

(b) Explain about Poisson probability distribution with example.

19. 200 digits are chosen at random from a set of tables. The frequencies of the digits are as follows:

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use Chi-Square test to assess the correctness of the hypothesis that the digits were distributed in equal numbers in the tables from which they were chosen. (Given the chi-Square value for 9 degrees of freedom at 5% level is 16.22)

20. A tea company appoints four salesman A,B, C and D and observes their sales in three seasons-Summer, Winter and Monsoon. The figures (in lakhs) are given in the following table:

Seasons	Salesmen				Season's total
	A	B	C	D	
Summer	36	36	21	35	128
Winter	28	29	31	32	120
Monsoon	26	28	29	29	112
Salesman's Total	90	93	81	96	360

(a) Do the salesmen significantly differ in performance.

(b) Is there significant difference between the seasons?

13. (a) What are the functions of hypothesis?

Or

(b) Who has a longer life span? Test at .05 significance level.

Non-drug user: Average life span = 82.5 years; standard deviation = 12 years; n = 120.

Drug user: Average life span = 72.5 years; standard deviation = 12.5 years; n = 50.

14. (a) In an experiment on immunization of cattle from Tuberculosis the following result were obtained.

Experiment	Affected	Not Affected	Total
Inoculated	267	27	294
Not Inoculated	757	155	912
Total	1024	182	1206

Use χ^2 Test to determine the efficacy of vaccine in preventing tuberculosis.

Or

(b) A die is thrown 132 times with following results:

No. turned up	1	2	3	4	5	6
Frequency	16	20	25	14	29	28

Is the die unbiased?

15. (a) Two random samples were drawn from two normal populations and their values are:

A	66	67	75	76	82	84	88	90	92	-	-
B	64	66	74	78	82	85	87	92	93	95	97

Test whether the two populations have the same variance at 5% level at 5% level of significance. (F=3.36 at 5% level of significance for v_1=10 and v_2=8)

Or

(b) Three composition instructors recorded the number of spelling errors which their students made on a research paper. At 1% level of significance test whether there is significant difference in the average number of errors in the three classes of students.

Instructor 1	2	3	5	0	8	-	-
Instructor 2	4	6	8	4	9	0	2
Instructor 3	5	2	3	2	3	3	-

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Obtain the two regression lines from the following data:

X	6	2	10	4	8
Y	9	11	5	8	7

17. Explain about sampling and sampling distribution.

18. The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data:

Item	1	2	3	4	5	6	7	8	9	10
Life in '000 hrs	4.2	4.6	3.9	4.1	5.2	3.8	3.9	4.3	4.4	5.6

Can we accept the hypothesis that the average life time of bulbs is 4,000 hrs. (Given that the t value for 9 degrees of freedom for 5% level is 2.262)